

**ICPMS and Radiochemical Measurements: An Introductory Shortcourse**  
**Bradley K. Esser and G. Price Russ**

51st Annual Radiobioassay & Radiochemical Measurements Conference  
Emperor Ballroom, Caesars Tahoe in South Lake Tahoe  
Monday 1:00-5:00 pm, October 24, 2005

This short course is intended as a basic introduction to the use of mass spectrometry to quantify radioactive isotopes and their daughters in environmental, waste and process samples. The course will focus on inductively-coupled plasma mass spectrometry (ICPMS) for low-level environmental analysis, although other varieties of inorganic mass spectrometry will be mentioned, and non-environmental applications such as U bioassay will be discussed. Basic principles in the application of mass spectrometry to the precise determination of isotopic composition and concentration will be covered, and a number of case studies will be presented.

Examples of the types of questions that will be addressed include

- How does one choose between mass spectrometry and radiation detection?
- How does one choose between the different types of inorganic mass spectrometry?
- What instrumental factors are important in making precise and accurate isotope measurements by ICPMS?
- How does one identify and correct for interferences and biases in mass spectrometry?
- How can one use isotope dilution as an absolute technique for determining activity?
- What types of standards are available, and how are they used?
- What sources of information are available on the use of mass spectrometry in the radiochemical laboratory?

A number of case studies will also be presented, including

- Uranium bioassay at Lawrence Livermore National Laboratory (LLNL)
- Characterization of uranium contaminant plumes at LLNL and at Hanford
- Low-level quantification of actinides by multi-collector ICPMS
- Integrated use of mass spectrometry and counting to determine isotopic composition

Presenters will include

- Bradley K. Esser (Chemistry & Material Science, LLNL)
- G. Price Russ (Chemistry & Material Science, LLNL)
- John N. Christensen (Center for Isotope Geochemistry, Lawrence Berkeley National Laboratory)
- Carolyn T. Wong (Hazards Control, LLNL)
- Erick Ramon (Chemistry & Material Science, LLNL)

This work was performed under the auspices of the U.S. Department of Energy by University of California, Lawrence Livermore National Laboratory under Contract W-7405-Eng-48.